REMARKS

The remarks presented herein attend to all outstanding issues in the pending Office Action of January 26, 2006. Claims 1-36, 38 and 39 remain pending in this application, of which claims 1, 15, 24 and 31 are independent.

Claims 1, 15, 24 and 31 have been amended to recite an electrical conductor that is not configured to encircle a cableway system component. Support for this amendment may be found, for example, in FIGS. 1-4 and 6-9. No new matter has been added. The claims patentably distinguish the cited references for the reasons explained below.

The present application relates to a system and method for deicing cableway system components. A high-frequency AC voltage is generated in an electrical conductor that is physically separated from, and not configured to encircle, a cableway system component. An electromagnetic field (EMF) is created as a result of the high-frequency AC voltage. The EMF causes dielectric heating in ice formed on the cableway. There is substantially no heating of the cableway component itself, rather, the EMF oscillation may be tuned for the excitation of water as ice.

Rejections Under 35 U.S.C. §103

2. Claims 1, 2, 4-7, 12-16, 19-20, 24-27 and 29-37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shimada et al. (JP411332074A) (hereinafter "Shimada") in view of U.S. Patent No. 3,610,861 granted to Storey (hereinafter "Storey"). Applicants respectfully traverse the rejection in view of the amended claims, which clarify that the electrical conductor does not circumscribe the cableway system component. The references fail to teach or even suggest this aspect of what is claimed, and so for at least this reason what is claimed is not *prima facie* obvious over these references.

The Examiner uses Shimada to show a method and system for melting ice and snowfall from an overhead power transmission line 1 by applying high frequency of from 2,350 to 2,550 MHz to the overhead power transmission line 1. Shimada discloses that the high frequency current is added to the overhead power transmission line 1 by a 'high frequency applying coil 5' that carries a current from a high frequency transmission circuit 4. Shimada also discloses that power for the high frequency transmission circuit 4 is from

the overhead power transmission line via a 'pick up power source 2'. Shimada is silent about the 'high frequency applying coil 5' being in contact or not with the power transmission line 1.

Storey discloses an induction heating system. The system includes a conveyor for moving workpieces such as metal bars through an induction heating coil. The reliance upon Storey appears to be misplaced where the heating thereof is by induction to heat a metal bar. This type of heating is very different from the molecular excitation of water. If Storey were combined with Shimada, the power requirements would be rather large due to the need to heat the underlying metal of the cableway system, as opposed to the excitation of ice. Furthermore, Storey fails to disclose any frequency, let alone a frequency tuned for the excitation of ice, and Shimada does not teach or suggest the frequency domain of, for example, claims 9 or 32. Accordingly, it is seen that the combination of Shimada and Storey does not teach or suggest what is claimed, where also such a combination would be inoperable to perform the excitation of ice.

It is further the case that Storey is improperly combined with Shimada as nonanalogous art. A reference must either be in the field of an applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant is concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). The claims address the removal of ice from a cableway to provide enhanced safety by frequency oscillation for the excitation of ice. In contrast, Storey teaches inductive heating of workpieces moving through a coil on a manufacturing conveyor system. Such inductive heating systems are used, for example, to solder, braze, harden and/or melt metals, i.e., for high temperature solid-state applications. In designing a system to melt ice, one would not look to metallurgical applications for guidance. Storey is non-analogous art to the present invention.

Further, the combination of Shimada and Storey fails to disclose, at least that the electrical conductor is not configured to encircle the cableway system component, and so the references fail to teach or suggest all elements of what is claimed. Although stated as a negative limitation, it is also a structural hallmark of a different type of heating

arrangement where what is claimed does not require the use of a coil circumscribing the cableway. Both Shimada and Storey require coils. Specifically, Shimada discloses a 'high frequency applying coil 5' and Storey discloses an induction coil 10. For this reason alone, Shimada and Storey fail to render claim 1 obvious.

Reconsideration of claim 1 is respectfully requested.

Claims 2, 4-7 and 12-14 depend from claim 1 and benefit from like argument. However, these claims have additional features that patentably distinguish over Shimada in view of Storey. For example, claim 5 recites an electrical sink, the electrical sink located proximate to the electrical conductor to increase the strength of the alternating electric field at the surface. Neither Shimada nor Storey disclose or suggest that an electrical sink is proximate to the electrical conductor to increase the strength of the alternating electric field at the surface. Claim 12 recites the cableway system component is a cableway. Neither Shimada nor Storey disclose a cableway. Claim 13 recites the cableway system component is a cableway system tower. The Examiner asserts that Shimada would inherently use a tower to connect the power lines to it. However, Shimada does not disclose or suggest means for removing ice from a tower.

Reconsideration of claims 2, 4-7 and 12-14 is respectfully requested.

Amended claim 15 recites a system for melting ice on a cableway system component, and includes the following elements:

(a) a first electrical conductor disposed at a distance of about from 0 to 30 cm from the ice wherein a physical space separates the first electrical conductor from the cableway system component and wherein the electrical conductor is not configured to encircle the cableway system component; and

(b) an AC power source for providing a high-frequency AC voltage in the first electrical conductor so that the AC voltage generates a high-frequency alternating electric field in the ice.

Shimada and Storey fail to disclose at least that "the electrical conductor is not configured to encircle the cableway system component," and so claim 15 is patentable for

at least the reasons discussed above with respect to claim 1. Further, as discussed above, the combination of Shimada and Storey fails to create an operable cableway or powerline de-icing system. A system of Shimada/Storey incorporating a physical space would create inductive heating at a small localized area, or otherwise require a coil around the entire cable – in which case it would be impossible for ice to have formed on a cableway system component. The combination of Shimada and Storey fails to render claim 15 obvious.

Reconsideration of claim 15 is requested.

Claims 16 and 19-20 depend from claim 15 and benefit from like argument. However, these claims have additional features that patentably distinguish over Shimada in view of Storey. For example, claim 16 recites an electrical sink, the electrical sink disposed at a distance of about from 0 to 30 cm from the first electrical conductor to increase the strength of the alternating electric field. Shimada does not disclose an electrical sink located at a distance of about 0 to 30 cm from the first electrical conductor to increase the strength of the alternating electric field.

Reconsideration of claims 16 and 19-20 is respectfully requested.

Claim 24 recites a method for de-icing a surface of a cableway system component, including a step of applying a high-frequency AC voltage to an electrical conductor that is located proximate to the surface, to generate a high-frequency alternating electric field that melts ice at the surface, wherein a physical space separates the electrical conductor from the surface and wherein the electrical conductor is not configured to encircle the cableway system component. As argued above, Shimada and Storey fail to disclose an electrical conductor that is not configured to encircle the cableway system component. Further, Shimada cannot be modified according to Storey to create an operable cableway deicing system, where a coil surrounding the surface would prevent ice from forming on the surface. Claim 24 is not rendered obvious by the combination of Shimada and Storey.

Reconsideration of claim 24 is requested.

Claims 25-27 and 29-30 depend from claim 24 and benefit from like argument. However, these claims have additional features that patentably distinguish over Shimada in view of Storey. Claim 25 recites applying high-frequency AC voltage including

flowing AC current with a frequency in a range of about from 60 kHz to 100 kHz. Shimada discloses a frequency range of 2,350 to 2,550 MHz (i.e., 2.35-2.55 GHz) which is not in the range 60 kHz - 100 kHz of the immediate application. Storey is silent with regard to an AC frequency. Claim 26 recites applying AC voltage with a voltage in a range of about from 3 kV to 15 kV. Nowhere does Shimada or Storey disclose an AC voltage, let alone the voltage range of about from 3 kV to 15 kV as required by claim 26. Claim 27 recites separating the electrical conductor from the cableway system component using an electrically insulating spacer. Neither Shimada nor Storey recite an insulating spacer.

Claim 30 also depends from claim 24 and recites the steps of:

(a) connecting an AC power source to the cableway system component;

(b) connecting the AC power source to the electrical conductor; and

(c) connecting the AC power source to the electrical ground, so that the AC power source energizes the cableway system component and the electrical conductor at the same AC potential but 180 degrees out of phase from each other.

Neither Shimada nor Storey disclose or suggest energizing a cableway system component and an electrical conductor with the same AC potential but 180 degrees out of phase from each other. The combination of Shimada and Storey fails to render claim 30 obvious.

Reconsideration of claims 25-27 and 29-30 is respectfully requested.

Claim 31 recites a method for melting ice on a cableway system component, including an element of applying a high-frequency AC voltage to a first electrical conductor that is located at a distance of about from 0 to 30 cm from the ice, wherein a physical space separates the first electrical conductor from the cableway system component and wherein the electrical conductor is not configured to encircle the cableway system component, to generate a high-frequency alternating electric field that melts the ice. As argued above, the combination of Shimada and Storey fails disclose every element of Applicants' amended claims or to create an operable cableway deicing system.

Reconsideration of claim 31 is requested.

Claims 32-37 depend from claim 31 and benefit from like argument. However, these claims have additional features that patentably distinguish over Shimada in view of Storey. For example, claim 32 recites applying high-frequency AC voltage including flowing AC current with a frequency in a range of about from 60 kHz to 100 kHz. Shimada discloses a frequency range of 2,350 to 2,550 MHz (i.e., 2.35-2.55 GHz) which is not in the range 60 kHz - 100 kHz of the immediate application. Storey does not disclose a frequency. Claim 33 recites applying AC voltage with a voltage in a range of about from 3 kV to 15 kV. Nowhere does Shimada or Storey disclose applying an AC voltage in a range of about from 3 kV to 15 kV. Claim 34 recites providing an electrical sink within a distance of about from 0 to 30 cm from the first electrical conductor. Neither Shimada nor Storey disclose an electrical sink within a distance of about from 0 to 30 cm from the first electrical conductor.

Reconsideration of claims 32-36 is respectfully requested.

In view of the above remarks, Applicants contend that claims 1, 2, 4-7,12-16, 19-20, 24-27 and 29-36 are allowable over Shimada in view of Storey. Reconsideration of claims 1, 2, 4-7,12-16, 19-20, 24-27 and 29-36 is respectfully requested.

3. Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Shimada in view of Storey and further in view of Wiseman (U.S. Patent No. 6,043,471).

Wiseman discloses a method for inductively heating a workpiece; the immediate application does not teach or require inductive heating. The immediate application teaches an apparatus and method for melting ice; Storey and Wiseman do not. Therefore, both Storey and Wiseman are non-analogous art to the immediate application. Further, it would not have been obvious to combine Shimada with Storey and/or Wiseman as required under 35 U.S.C. § 103(a). However, even when combined, Shimada, Storey, and Wiseman do not render claim 8 obvious.

Claim 8 depends from claim 1. As argued above, Shimada and Storey fail to disclose every element of Applicants' amended claim 1, and also lack motivation and an expectation of success, each of which is necessary to render claim 1 obvious.

Claim 8 recites the cableway system component is electrically conductive and is connected to the AC power source, the electrical conductor is connected to the AC power

source, so that the AC power source energizes the cableway system component and the electrical conductor at the same AC potential but 180 degrees out of phase from each other. None of Shimada, Storey or Wiseman disclose or suggest energizing the cableway system component and the electrical conductor at the same AC potential but 180 degrees out of phase from each other.

The Examiner asserts that Wiseman discloses a heating system with phase control in which MOSFET Q3 is 180 degrees out of phase with respect to MOSFET Q2. However, "when MOSFET Q3 is 180 degrees out of phase with respect to MOSFET Q2, MOSFET Q3 will be off the entire half cycle that MOSFET Q2 is on, and no pulse will be applied to the primary of transformer T1. Again, MOSFET Q4 will also be 180 degrees out of phase with respect to MOSFET Q1, an no pulse will be provided on the other half cycle" (col. 6, lines 28-34). When no electricity is pulsed through transformer T1, no electricity exits Wiseman's inverter and his inductive heating device is left unpowered, and thus inoperable. Wiseman is not advocating the use of 180 degree out of phase electricity to power a heating device.

Reconsideration of claim 8 is respectfully requested.

4. Claims 3, 9-10, 17-18, 25-26, and 28-37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shimada in view of Storey and U.S. Patent No. 3,042,918 granted to Casey (hereinafter, "Casey").

Casey discloses an antenna switching arrangement for controlling electrical connections in a radio transmitting system. The antenna switching arrangement allows the system to either transmit radio signals or engage a circuit for removing ice from the antenna. "...[I]ce removal is accomplished by circulating through the sections **10*a*** and **10*b*** of the antenna panel a low frequency current that heats the sections **10*a*** and **10*b*** sufficiently to melt any ice accumulated thereon." (col. 3, line 72 through col. 4, line 1). Casey, thus, uses traditional resistive heating of an electrical conductor to melt ice on the conductor. As discussed above, the present invention does not substantially heat the surface to be deiced.

There is no motivation to combine Shimada, Storey and Casey. For example, Casey advocates the use of a low frequency current. In contrast, Shimada proposes a

frequency of 2350 – 2550 MHz, and induction heating of the type described by Storey utilizes a maximum frequency of 60 MHz. The disparate frequency ranges of the references discourages their combination.

There is no expectation of successfully creating a cableway deicing system by combining Shimada, Storey and Casey. As discussed above, Storey teaches an inductive heating coil that creates a localized heating zone, and the localized heating would be insufficient to remove ice from a length of the power line. The addition of Casey to the combination of Storey and Shimada only lessens the expectation of success. The Examiner states, "Casey discloses a system for deicing antenna 10 comprising an electrical deicing circuit with a current source 85 with a voltage to the ground of 7.3 kv"; it is then asserted that connecting the system components to electrical ground is conventional in the art (Office Action dated January 26, 2006 at pages 3-4). Applicants maintain that it is not obvious to connect a power transmission line to ground. In fact, if the power transmission line of Shimada is connected to ground, not only is deicing not possible, the fundamental operation of the power transmission line is inhibited.

The combination of Shimada, Storey and Casey lacks motivation and an expectation of successfully rendering the inventions of independent claims 1, 15, 24 and 31. Applicants contend that these claims, and all claims dependent thereon, are patentable over Shimada in view of Storey and Casey.

Claim 3 recites the cableway system component is connected to electrical ground. As discussed above, electrical grounding of Shimada's powerline leads to inoperability. The combination of Shimada, Storey and Casey thus fails to render claim 3 obvious. Claim 9 recites the AC power source provides high-frequency AC voltage with a frequency in a range of about from 60 kHz to 100 kHz. Shimada discloses a frequency range of 2,350 to 2,550 MHz (i.e., 2.35-2.55 GHz) which is not in the range 60 kHz - 100 kHz of the immediate application. See at least: page 3, lines 13-15; page 4, lines 8-10; page 6, lines 20-21; and page 7, lines 9-10. It is not obvious to adjust a frequency from a gigahertz range to a kilohertz range to melt ice. Further, there is no motivation to modify the frequency of Shimada, since it already operates to melt ice from the power transmission line. Neither Storey nor Casey disclose a frequency for AC voltage. Claim

10 depends from claim 1 and recites the AC power source provides high-frequency AC voltage with a voltage in a range of about from 3 kV to 15 kV. Neither Shimada nor Storey disclose or suggest a voltage range. In fact, the voltage range of Shimada is probably dependent upon operation of the power transmission line, and therefore not selectable. Casey's voltage of 7.2 kV is selected based on the requirements of resistive heating. The present systems do not operate upon a resistive heating mechanism; there is thus no motivation to utilize Casey's voltage in the present systems.

Claim 17 depends from claim 15 and recites the electrical sink is connected to electrical ground. As argued above, use of electrical grounding would inhibit the function of Shimada's powerline. Claim 18 depends from claim 17 and recites the ice is disposed between the first electrical conductor and the electrical sink. Shimada is silent about the 'high frequency applying coil 5' being in contact or not with the power transmission line 1. Shimada therefore cannot be said to teach that ice is disposed between the first electrical conductor and the electrical sink. Storey relates to high temperature metallurgical applications; there is no mention of ice. The ice of Casey's antenna panel 10 is not disposed between an electrical conductor, e.g., 88, 90, and an electrical sink, e.g., ground 104, as both components are contained in a building having a roof 14. The combination of Shimada, Storey and Casey therefore cannot render claim 18 obvious. Claim 25 recites applying high-frequency AC voltage including flowing AC current with a frequency in a range of about from 60 kHz to 100 kHz. Shimada discloses a frequency range of 2,350 to 2,550 MHz (i.e., 2.35-2.55 GHz) which is not in the range 60 kHz - 100 kHz, and it is not obvious to adjust a frequency from a gigahertz range to a kilohertz range to melt ice. Storey and Casey fail to disclose an AC frequency. Claim 26 depends from claim 24 and recites applying AC voltage with a voltage in a range of about from 3 kV to 15 kV. Neither Shimada nor Storey disclose a voltage range at all, and there is no motivation to utilize Casey's resistive heating voltage of 7.2 kV in the present systems. Claim 28 depends from claim 24 and recites connecting the cableway system component to electrical ground. As argued above, the cableway system component has a surface from which ice is removed. Thus, in the system of Shimada, the power transmission line, from which ice is melted, would be required to be connected to ground and this is clearly not

reasonable, as this would prevent transmission of power through the power transmission line. Combining Shimada, Storey and Casey does nothing to overcome this argument. Claim 30 recites the cableway system component is electrically conductive and further includes the steps of connecting an AC power source to the cableway system component, connecting the AC power source to the electrical conductor, and connecting the AC power source to the electrical ground, so that the AC power source energizes the cableway system component and the electrical conductor at the same AC potential but 180 degrees out of phase from each other. None of Shimada, Storey or Casey discloses a cableway system component or energizing a cableway system component and an electrical conductor at the same AC potential but 180 degrees out of phase from each other.

Claim 31 recites a method for melting ice on a cableway system component, including an element of applying a high-frequency AC voltage to a first electrical conductor that is located at a distance of about from 0 to 30 cm from the ice, wherein a physical space separates the first electrical conductor from the cableway system component and wherein the electrical conductor is not configured to encircle the cableway system component, to generate a high-frequency alternating electric field that melts the ice.

There is no expectation of arriving at the systems and methods of the instant application by combining Shimada, Storey and Casey. Shimada and Storey operate on electromagnetic principles that require the use of electrical conductors in the form of coils. There is no motivation to change the geometry of – and, in essence, remove – a mandatory system component. For the sake of argument, however, if Shimada's 'high frequency applying coil 5' was modified so that it did not encircle the cableway system component (Casey), it would be necessary for Shimada's apparatus to be in direct contact with the power transmission line in order to receive electricity. Direct contact with a power transmission line would most likely overload 'high frequency transmission circuit 4', but, more importantly, claim 31 specifies that "a physical space separates the first electrical conductor from the cableway system component". The combination of Shimada, Storey and Casey does not render claim 31 obvious.

Claim 32 recites applying high-frequency AC voltage including flowing AC current with a frequency in a range of about from 60 kHz to 100 kHz. Shimada discloses a frequency range of 2,350 to 2,550 MHz (i.e., 2.35-2.55 GHz) which is not in the range 60 kHz - 100 kHz, and it is not obvious to adjust a frequency from a gigahertz range to a kilohertz range to melt ice. Storey and Casey fail to recite an AC frequency. Claim 33 recites applying AC voltage with a voltage in a range of about from 3 kV to 15 kV. Neither Shimada nor Storey disclose a voltage range at all, and there is no motivation to utilize Casey's resistive heating voltage of 7.3 kV in the present systems. Claim 35 recites the ice is located between the electrical conductor and the electrical sink. As discussed above, neither Shimada nor Storey teach or suggest that ice is located between the electrical conductor and the electrical sink, and ice is not located between Casey's conductor and ground, which are located within a housing.

In view of the above remarks, Applicants contend that claims 3, 9-10, 17-18, 25-26 and 28-36 are allowable over Shimada in view of Storey and Casey. Reconsideration of claims 3, 9-10, 17-18, 25-26 and 28-36 is respectfully requested.

5. Claims 21, 27 and 39 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shimada in view of Storey and further in view of Casey.

Claim 21 depends from claim 15 and recites a second electrical conductor connected to the AC power source, wherein the first electrical conductor is connected to the AC power source, so that the AC power source energizes the first electrical conductor and the second electrical conductor at the same AC potential but 180 degrees out of phase from each other. None of Shimada, Storey or Casey disclose energizing a first and second electrical conductor at the same AC potential but 180 degrees out of phase from each other. Shimada, Storey and Casey, alone or in combination, fail to render claim 21 obvious.

Claim 27 depends from claim 24 and further recites the step of separating the electrical conductor from the cableway system component using an electrically insulating spacer. None of Shimada, Storey or Casey disclose a cableway system component. Further, there is no suggestion or motivation in the references or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to

combine reference teachings. As discussed above, modifying Shimada according to Storey and Casey by inserting a physical space or insulating spacer fails to create an operable cableway or powerline de-icing system. A method according to Shimada, Storey and Casey incorporating a physical space would create inductive heating at a small localized area, or otherwise require a coil around the entire cable – in which case it would be impossible for ice to have formed on a cableway system component. Shimada, Storey and Casey, alone or in combination, fail to render claim 27 obvious.

Claim 39 depends from claim 31 and recites the steps of applying the AC voltage to a second electrical conductor 180 degrees out of phase from the first electrical conductor so that an AC power source energizes both the first and second electrical conductors. None of Shimada, Storey or Casey disclose energizing a first and second electrical conductor at the same AC potential but 180 degrees out of phase from each other. Shimada, Storey and Casey fail to disclose every element of Applicants' claim 39.

In view of the above remarks, Applicants contend that claims 21, 27 and 39 are allowable over Shimada in view of Storey and further in view of Casey. Reconsideration of claims 21, 27 and 39 is respectfully requested.

Conclusion

The Examiner appears to have created rejections based on 'piecemeal' findings in individual references for each element of Applicant's claims, e.g., physical space, voltage, electrical grounding. The piecemeal references lack motivation or suggestion for their combination, as well as relevance to the present invention or one another. The Court has held that "…every element of a claimed invention may often be found in the prior art. However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention" *In re Rouffet,* 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir 1988).

In view of the above Remarks, Applicants have addressed all issues raised in the Office Action dated January 26, 2006, and respectfully solicit a Notice of Allowance. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

Authorization to charge fees associated with a one-month extension of time is submitted herewith; if any additional fee is deemed necessary in connection with this Response, the Commissioner is authorized to charge Deposit Account No. 12–0600.

Respectfully submitted,

LATHROP & GAGE L.C.

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